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U.S. Department of the Interior • U.S. Geological Survey

# MINERAL INDUSTRY SURVEYS

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## TUNGSTEN IN DECEMBER 1997

According to preliminary data from the U.S. Geological Survey, U.S. tungsten processors' 1997 net production of intermediate tungsten products, including metal powder and tungsten carbide powder produced from hydrogen-reduced metal powder, was 7% higher than 1996 net production. U.S. production of ammonium paratungstate (APT) increased 13% in 1997 as compared with APT production in 1996. Trade data for November 1997 are included in this issue. Trade data for December will be published in a subsequent issue.

### Note

All data in this report have been rounded to no more than three significant digits. Totals were calculated by using

unrounded data.

### Price

Prices for tungsten ore in dollars per metric ton unit (\$/mtu) from Metal Bulletin are listed below. Prices in dollars per short ton unit (\$/stu) were converted from metric ton unit prices and rounded to the nearest dollar. These prices represent combined prices for wolframite and scheelite ores with a minimum  $\text{WO}_3$  content of 65%.

January 1-31, 1998

Low \$40/mtu  $\text{WO}_3$  (\$36/stu  $\text{WO}_3$ )

High \$52/mtu  $\text{WO}_3$  (\$47/stu  $\text{WO}_3$ )

TABLE 1  
U.S. SALIENT TUNGSTEN STATISTICS 1/

(Metric tons, tungsten content)

| Period    | Concentrate             |                               |                                | Reported<br>scrap<br>consumption | Intermediate products |                            |                                |
|-----------|-------------------------|-------------------------------|--------------------------------|----------------------------------|-----------------------|----------------------------|--------------------------------|
|           | Reported<br>consumption | Imports<br>for<br>consumption | Stocks,<br>end of<br>period 2/ |                                  | Net<br>production 3/  | Reported<br>consumption 4/ | Stocks,<br>end of<br>period 5/ |
| 1996      | 5,420                   | 4,190                         | 569                            | 2,560                            | 7,810                 | 7,530                      | 1,400                          |
| 1997:     |                         |                               |                                |                                  |                       |                            |                                |
| January   | 426                     | 260                           | 808                            | 223                              | 679                   | 613                        | 1,400                          |
| February  | 533                     | 276                           | 584                            | 185                              | 682                   | 623 r/                     | 1,440                          |
| March     | 698                     | 480                           | 650                            | 247                              | 676                   | 625 r/                     | 1,450                          |
| April     | 586                     | 202                           | 630                            | 217                              | 802                   | 626 r/                     | 1,370                          |
| May       | 536                     | 753                           | 542                            | 173                              | 534                   | 522 r/                     | 1,210                          |
| June      | 674                     | 366                           | 596                            | 228                              | 764                   | 611 r/                     | 1,300                          |
| July      | 633                     | 415                           | 775                            | 285                              | 789                   | 599 r/                     | 1,430                          |
| August    | 522                     | 282                           | 566                            | 256                              | 538                   | 600 r/                     | 1,360                          |
| September | 545                     | 600                           | 594                            | 233                              | 702                   | 613 r/                     | 1,320                          |
| October   | 388 r/                  | 284                           | 529 r/                         | 277 r/                           | 738 r/                | 633 r/                     | 1,210                          |
| November  | 422 r/                  | 260                           | 637 r/                         | 210 r/                           | 640 r/                | 620 r/                     | 1,260                          |
| December  | 629                     | NA                            | 658                            | 191                              | 790                   | 612                        | 1,290                          |
| Total     | 6,590                   | NA                            | XX                             | 2,720                            | 8,340                 | 7,300                      | XX                             |

r/ Revised. NA Not available. XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Reported by consumers.

3/ Net production of tungsten metal powder, tungsten carbide powder, chemicals, and other products.

4/ Includes data on tungsten carbide powder from secondary sources.

5/ Reported by producers.

TABLE 2  
U.S. PRODUCTION, CONSUMPTION, AND STOCKS OF  
AMMONIUM PARATUNGSTATE, BY MONTH 1/

(Metric tons, tungsten content)

| Period    | Production | Consumption | Stocks,<br>end of<br>period 2/ |
|-----------|------------|-------------|--------------------------------|
| 1996      | 4,450 3/   | 7,800       | 558                            |
| 1997:     |            |             |                                |
| January   | 540        | 663         | 572                            |
| February  | W          | 689         | 586                            |
| March     | W          | 712         | 690                            |
| April     | W          | 790         | 666                            |
| May       | 645        | 716         | 750                            |
| June      | 765        | W           | W                              |
| July      | 726        | 816         | 798                            |
| August    | 669        | 834         | W                              |
| September | 665        | 782         | W                              |
| October   | 667 r/     | 941 r/      | 717 r/                         |
| November  | W          | 772 r/      | 540 r/                         |
| December  | W          | W           | 556                            |
| Total     | 4,680      | 7,720       | XX                             |

r/ Revised. W Withheld to avoid disclosing company proprietary data; not included in total.

XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Producers and consumers.

3/ Excludes four months of withheld data.

TABLE 3  
U.S. PRODUCTION AND STOCKS OF TUNGSTEN PRODUCTS 1/

(Metric tons, tungsten content)

| Product   | Net production 2/ |          |          |              | Stocks at end of period |          |          |
|---|-------------------|----------|----------|--------------|-------------------------|----------|----------|
|   | 1997              |          |          |              | 1997                    |          |          |
|   | 1996              | November | December | Year to date | 1996                    | November | December |
| Metal powder  | 3,720             | 221 r/   | 388      | 3,450        | 867                     | 728 r/   | 739      |
| Tungsten carbide powder<br>(made from metal powder) | 4,090             | 419 r/   | 402      | 4,890        | 406                     | 434 r/   | 452      |
| Cast and crystalline<br>carbide powder; other       | W                 | --       | --       | --           | W                       | W        | W        |
| Chemicals   | W                 | W        | W        | W            | 131                     | 99 r/    | 94       |
| Total   | 7,810             | 640 r/   | 790      | 8,340        | 1,400                   | 1,260    | 1,290    |

r/ Revised. W Withheld to avoid disclosing company proprietary data; not included in total.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Gross production less quantity used to make other products in table.

TABLE 4  
U.S. REPORTED CONSUMPTION OF TUNGSTEN, BY END USE IN 1997 1/ 2/

(Metric tons, tungsten content)

| End use   | November | December | Year to date |
|---|----------|----------|--------------|
| Steel:  |          |          |              |
| Tool  | W        | W        | W            |
| Other   | 12       | 10       | 132          |
| Superalloys                                       | 21       | 21       | 258          |
| Other alloys (excludes steels and superalloys) 3/ | W        | W        | W            |
| Cemented carbides 4/ 5/                           | 453 r/   | 455      | 5,490        |
| Mill products made from metal powder              | 41 r/    | 33       | W            |
| Chemical uses 6/                                  | W        | W        | W            |
| Miscellaneous and unspecified                     | 93 r/    | 93       | 1,420        |
| Total   | 620 r/   | 612      | 7,300        |

r/ Revised. W Withheld to avoid disclosing company proprietary data; included with "Miscellaneous and unspecified."

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Does not include materials used in making primary tungsten products.

3/ Includes welding and hard-facing rods and materials, wear- and corrosion-resistant alloys, and nonferrous alloys.

4/ Formerly called "Cutting and wear-resistant materials." Includes diamond bit matrices, cemented and sintered carbides, and cast carbide dies or parts.

5/ Based on reported consumption plus information from other sources.

6/ Formerly called "Chemical and ceramic uses."

TABLE 5  
U.S. REPORTED CONSUMPTION AND CONSUMER STOCKS OF TUNGSTEN MATERIALS IN 1997 1/ 2/

(Metric tons, tungsten content)

| Period           | Ferro-<br>tungsten | Tungsten<br>metal<br>powder | Tungsten<br>carbide<br>powder 3/ | Scheelite<br>(natural,<br>synthetic) | Tungsten<br>scrap | Other<br>tungsten<br>materials 4/ | Total  |
|------------------|--------------------|-----------------------------|----------------------------------|--------------------------------------|-------------------|-----------------------------------|--------|
| Consumption:     |                    |                             |                                  |                                      |                   |                                   |        |
| January          | 48                 | 38                          | 492                              | --                                   | 29                | 6                                 | 613    |
| February         | 48                 | 55                          | 486 r/                           | --                                   | 26                | 8                                 | 623 r/ |
| March            | 42                 | 46                          | 499 r/                           | --                                   | 28                | 10                                | 625 r/ |
| April            | 47                 | 60                          | 481 r/                           | --                                   | 29                | 8                                 | 626 r/ |
| May              | 34                 | 59                          | 394 r/                           | --                                   | 27                | 7                                 | 522 r/ |
| June             | 33                 | 53                          | 493 r/                           | --                                   | 21                | 11                                | 611 r/ |
| July             | 32                 | 44                          | 489 r/                           | --                                   | 26                | 9                                 | 599 r/ |
| August           | 34                 | 47                          | 483 r/                           | --                                   | 28                | 8                                 | 600 r/ |
| September        | 34                 | 58                          | 484 r/                           | --                                   | 29                | 8                                 | 613 r/ |
| October          | 32                 | 63 r/                       | 500 r/                           | --                                   | 32                | 6                                 | 633 r/ |
| November         | 35                 | 55 r/                       | 501 r/                           | --                                   | 22 r/             | 7                                 | 620 r/ |
| December         | 33                 | 47                          | 502                              | --                                   | 22                | 8                                 | 612    |
| January-December | 453                | 625                         | 5,800                            | --                                   | 321               | 96                                | 7,300  |
| Stocks:          |                    |                             |                                  |                                      |                   |                                   |        |
| January          | 21                 | 38                          | 293                              | --                                   | 23                | 11                                | 387    |
| February         | 24                 | 26                          | 280                              | --                                   | 22                | 12                                | 363    |
| March            | 24                 | 26                          | 297                              | --                                   | 26                | 17                                | 390    |
| April            | 25                 | 26                          | 304                              | --                                   | 29                | 12                                | 396    |
| May              | 18                 | 26                          | 286                              | --                                   | 27                | 19                                | 376    |
| June             | 17                 | 26                          | 314                              | --                                   | 26                | 14                                | 396    |
| July             | 21                 | 26                          | 316                              | --                                   | 32                | 16                                | 410    |
| August           | 23                 | 18                          | 275                              | --                                   | 32                | 14                                | 362    |
| September        | 21                 | 18                          | 317                              | --                                   | 30                | 17                                | 403    |
| October          | 25                 | 15 r/                       | 274 r/                           | --                                   | 23                | 12                                | 350 r/ |
| November         | 28                 | 15 r/                       | 281 r/                           | --                                   | 31 r/             | 15                                | 371 r/ |
| December         | 26                 | 16                          | 278                              | --                                   | 31                | 13                                | 363    |

r/ Revised.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Does not include materials used in making primary tungsten products.

3/ Based on reported consumption plus information from other sources.

4/ Includes tungsten chemicals.

TABLE 6  
U.S. IMPORTS FOR CONSUMPTION OF TUNGSTEN, BY COUNTRY 1/

(Metric tons, tungsten content)

| Period and country<br>of origin | Ores and<br>concentrates | Ammonium<br>tungstates | Ferro-<br>tungsten | Metal<br>powder | Tungsten<br>carbide | Other e/ 2/ | Total  | Total<br>year to<br>date p/ 3/ |
|---------------------------------|--------------------------|------------------------|--------------------|-----------------|---------------------|-------------|--------|--------------------------------|
| 1996                            | 4,190                    | 1,580                  | 535                | 404             | 404                 | 2,820       | 9,930  | XX                             |
| 1997:                           |                          |                        |                    |                 |                     |             |        |                                |
| September                       | 600                      | 165                    | 107                | 35              | 52                  | 172         | 1,130  | 8,410                          |
| October                         | 284                      | 238                    | 43                 | 13              | 49                  | 269         | 896    | 9,310                          |
| November:                       |                          |                        |                    |                 |                     |             |        |                                |
| Australia                       | --                       | --                     | --                 | --              | --                  | --          | --     | 23                             |
| Austria                         | --                       | --                     | --                 | 3               | --                  | 1           | 4      | 44                             |
| Belgium                         | --                       | --                     | --                 | (4/)            | --                  | --          | (4/)   | 26                             |
| Bolivia                         | 52                       | --                     | --                 | --              | --                  | --          | 52     | 560                            |
| Canada                          | --                       | --                     | --                 | --              | 24                  | 2           | 26     | 46                             |
| Chile                           | --                       | --                     | --                 | --              | --                  | --          | --     | 46                             |
| China                           | --                       | 177                    | --                 | 30              | 68                  | 106         | 381    | 3,750                          |
| Czech Republic                  | --                       | --                     | --                 | 5               | --                  | --          | 5      | 28                             |
| France                          | --                       | --                     | --                 | --              | --                  | (4/)        | (4/)   | 25                             |
| Germany                         | --                       | (4/)                   | --                 | 6               | 1                   | 3           | 11     | 422                            |
| Hong Kong                       | --                       | --                     | --                 | 2               | 7                   | (4/)        | 8      | 257                            |
| Hungary                         | --                       | --                     | --                 | --              | --                  | (4/)        | (4/)   | 7                              |
| India                           | --                       | --                     | --                 | --              | --                  | --          | --     | 11                             |
| Ireland                         | --                       | --                     | --                 | --              | --                  | --          | --     | (4/)                           |
| Israel                          | --                       | --                     | --                 | --              | 1                   | 2           | 3      | 42                             |
| Italy                           | --                       | --                     | --                 | --              | --                  | --          | --     | (4/)                           |
| Japan                           | --                       | --                     | --                 | 2               | --                  | 2           | 4      | 83                             |
| Kazakstan                       | --                       | --                     | --                 | --              | --                  | --          | --     | 626                            |
| Korea, Republic of              | --                       | --                     | --                 | --              | 6                   | --          | 6      | 15                             |
| Latvia                          | --                       | --                     | --                 | --              | --                  | --          | --     | 31                             |
| Mexico                          | 14                       | --                     | --                 | --              | --                  | 1           | 15     | 174                            |
| Netherlands                     | --                       | --                     | --                 | --              | --                  | (4/)        | (4/)   | 18                             |
| Peru                            | 42                       | --                     | --                 | --              | --                  | --          | 42     | 212                            |
| Portugal                        | 102                      | --                     | --                 | --              | --                  | --          | 102    | 756                            |
| Russia                          | 51                       | --                     | 41                 | --              | --                  | --          | 92     | 2,420                          |
| Rwanda                          | --                       | --                     | --                 | --              | --                  | --          | --     | 51                             |
| Singapore                       | --                       | --                     | --                 | --              | --                  | (4/)        | (4/)   | 1                              |
| South Africa                    | --                       | --                     | --                 | --              | --                  | --          | --     | 1                              |
| Spain                           | --                       | --                     | --                 | --              | --                  | --          | --     | (4/)                           |
| Sweden                          | --                       | --                     | --                 | --              | --                  | 3           | 3      | 76                             |
| Switzerland                     | --                       | --                     | --                 | --              | --                  | 2           | 2      | 12                             |
| Taiwan                          | --                       | --                     | --                 | --              | --                  | --          | --     | (4/)                           |
| Thailand                        | --                       | --                     | --                 | --              | --                  | --          | --     | 26                             |
| Turkey                          | --                       | --                     | --                 | --              | --                  | --          | --     | 1                              |
| United Kingdom                  | --                       | --                     | --                 | 32              | --                  | (4/)        | 32     | 297                            |
| Uzbekistan                      | --                       | --                     | --                 | --              | --                  | --          | --     | 17                             |
| Total                           | 260                      | 178                    | 41                 | 79              | 107                 | 123         | 788    | 10,100                         |
| Total, year to date p/ 3/       | 4,180                    | 1,970                  | 788                | 403             | 591                 | 2,170       | 10,100 | XX                             |

e/ Tungsten content estimated in part. p/ Preliminary. XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes other unwrought tungsten, wrought tungsten, calcium and other tungstates, tungsten oxides, tungsten chlorides, other tungsten compounds, ash and residues containing mainly tungsten, and other mixtures of inorganic compounds containing tungsten.

3/ May include revisions to previous months' data.

4/ Less than 1/2 unit.

Note: Imports of waste and scrap in November 1997 totaled 66 metric tons, tungsten content.

Source: Bureau of the Census.

TABLE 7  
U.S. EXPORTS OF TUNGSTEN, BY COUNTRY 1/

(Metric tons, tungsten content)

| Period and country<br>of destination | Ores and<br>concentrates e/ | Ammonium<br>tungstates | Metal<br>powder e/ | Tungsten<br>carbide | Other e/ 2/ | Total | Total<br>year to<br>date |
|--------------------------------------|-----------------------------|------------------------|--------------------|---------------------|-------------|-------|--------------------------|
| 1996                                 | 72                          | 150                    | 240                | 1,290               | 289         | 2,040 | XX                       |
| 1997:                                |                             |                        |                    |                     |             |       |                          |
| September                            | (3/)                        | (3/)                   | 37                 | 76                  | 34          | 148   | 1,430                    |
| October                              | 1                           | 47                     | 31                 | 90                  | 43          | 212   | 1,640                    |
| November:                            |                             |                        |                    |                     |             |       |                          |
| Argentina                            | --                          | --                     | --                 | --                  | --          | --    | 2                        |
| Australia                            | --                          | --                     | --                 | 1                   | 4           | 5     | 13                       |
| Austria                              | --                          | --                     | --                 | 2                   | (3/)        | 2     | 41                       |
| Belgium                              | --                          | 13                     | 8                  | --                  | (3/)        | 21    | 53                       |
| Bolivia                              | --                          | --                     | --                 | --                  | --          | --    | (3/)                     |
| Brazil                               | --                          | --                     | 1                  | 1                   | (3/)        | 2     | 16                       |
| Canada                               | --                          | --                     | 5                  | 18                  | 10          | 33    | 426                      |
| Chile                                | --                          | --                     | (3/)               | --                  | (3/)        | (3/)  | 1                        |
| China                                | --                          | --                     | --                 | --                  | (3/)        | (3/)  | 3                        |
| Denmark                              | --                          | --                     | --                 | 1                   | --          | 1     | 5                        |
| France                               | --                          | --                     | --                 | 16                  | (3/)        | 17    | 72                       |
| Germany                              | (3/)                        | --                     | 13                 | 17                  | 10          | 41    | 455                      |
| Hong Kong                            | --                          | --                     | (3/)               | --                  | (3/)        | (3/)  | 13                       |
| Hungary                              | --                          | --                     | --                 | --                  | 2           | 2     | 10                       |
| India                                | --                          | --                     | --                 | (3/)                | 3           | 4     | 33                       |
| Indonesia                            | --                          | --                     | --                 | --                  | --          | --    | 1                        |
| Ireland                              | (3/)                        | --                     | --                 | (3/)                | 1           | 1     | 6                        |
| Israel                               | --                          | --                     | 14                 | --                  | (3/)        | 14    | 31                       |
| Italy                                | --                          | --                     | --                 | 6                   | (3/)        | 6     | 82                       |
| Japan                                | --                          | 7                      | --                 | 3                   | 3           | 13    | 135                      |
| Korea, Republic of                   | --                          | --                     | (3/)               | 1                   | (3/)        | 1     | 30                       |
| Lithuania                            | --                          | --                     | --                 | --                  | (3/)        | (3/)  | 2                        |
| Luxembourg                           | --                          | --                     | --                 | --                  | --          | --    | (3/)                     |
| Mexico                               | --                          | --                     | (3/)               | 1                   | 2           | 3     | 53                       |
| Netherlands                          | --                          | 11                     | --                 | --                  | (3/)        | 11    | 29                       |
| New Zealand                          | --                          | --                     | --                 | --                  | --          | --    | (3/)                     |
| Peru                                 | --                          | --                     | --                 | --                  | --          | --    | 2                        |
| Philippines                          | --                          | --                     | --                 | (3/)                | --          | (3/)  | 1                        |
| Portugal                             | --                          | --                     | --                 | --                  | --          | --    | 3                        |
| Russia                               | --                          | --                     | --                 | --                  | --          | --    | 1                        |
| Saudi Arabia                         | --                          | --                     | --                 | --                  | --          | --    | 1                        |
| Singapore                            | --                          | --                     | --                 | 8                   | 1           | 9     | 49                       |
| South Africa                         | --                          | --                     | (3/)               | 11                  | --          | 11    | 47                       |
| Spain                                | --                          | --                     | 3                  | --                  | 4           | 7     | 17                       |
| Sweden                               | --                          | --                     | (3/)               | --                  | (3/)        | (3/)  | 83                       |
| Switzerland                          | --                          | --                     | 5                  | --                  | (3/)        | 5     | 33                       |
| Taiwan                               | --                          | --                     | --                 | 4                   | 3           | 7     | 44                       |
| Thailand                             | --                          | --                     | --                 | --                  | --          | --    | 1                        |
| Turkey                               | --                          | --                     | --                 | --                  | --          | --    | 1                        |
| United Arab Emirates                 | --                          | --                     | --                 | --                  | --          | --    | (3/)                     |
| United Kingdom                       | (3/)                        | --                     | 3                  | --                  | 1           | 4     | 49                       |
| Venezuela                            | --                          | --                     | --                 | 9                   | (3/)        | 9     | 18                       |
| Other                                | --                          | --                     | 6                  | --                  | (3/)        | 6     | 8                        |
| Total                                | (3/)                        | 31                     | 60                 | 100                 | 45          | 237   | 1,880                    |
| Total, year to date                  | 11                          | 121                    | 351                | 964                 | 428         | 1,880 | XX                       |

e/ Tungsten content estimated in part. XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes wrought tungsten, ferrotungsten, and other tungstates.

3/ Less than 1/2 unit.

Note: Estimated exports of waste and scrap in November 1997 totaled 83 metric tons, tungsten content.

Source: Bureau of the Census.